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DEPARTMENT OF AGRICULTURE
TANGANYIKA TERRITORY

Sisal Experimental Station Report for the year 1938

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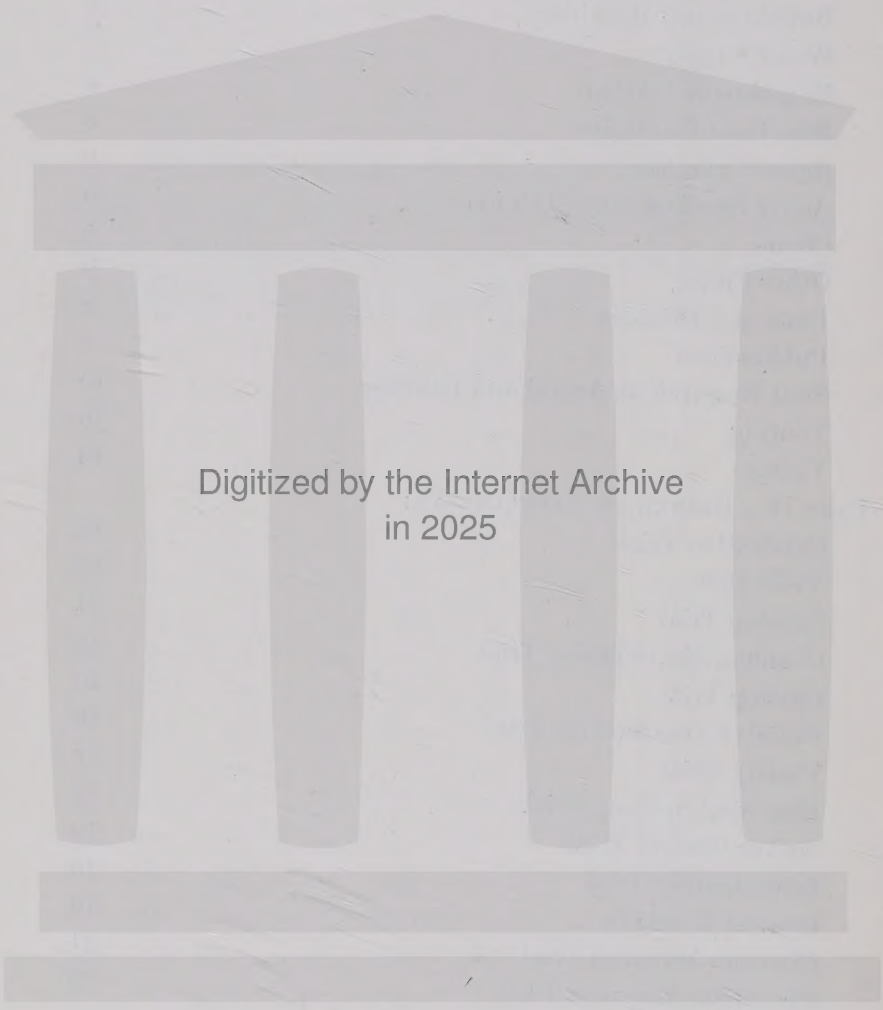

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Foreword

The fourth annual report of the Sisal Experimental Station is divided into two parts as formerly, the first dealing with the development and general activities of the station and the second reviewing the progress of the field trials planted last year and other experimental work with sisal.

SISAL EXPERIMENTAL STATION REPORT FOR THE YEAR 1938

PART I.—Staff

European.—Mr G. W. Lock, Agricultural Officer, was in charge of the station throughout the year under review. Mr A. A. E. Weirich, Agricultural Assistant, acted as assistant until Mr H. A. B. Fowler, Agricultural Assistant, returned from leave in July.

African.—The African staff consists of one clerk, four computers and seven recorders. The number of recorders was increased to assist in harvesting trials. Promotions were made from the ten probationers who had passed through a period of training.

The number of regular labourers was raised to forty. This labour shows an understanding of experimental methods which is indispensable for harvesting operations. The supply of general labour was short during the first half of the year but improved afterwards.

Weather

Although there were fewer rainy days the rainfall for the year is very little short of the average recorded over the past three years. The total precipitation amounted to 1,318·9mm. (51·9 inches) falling on a hundred and twenty days.

The main rains were better than usual being well distributed throughout the period March to May. The cool season which lasts until September was decidedly drier than had been experienced in previous years which slightly affected the growth rate of the sisal. Exceptionally heavy rains fell during October for the second year in succession. Disregarding this deluge the small rains were satisfactory.

Development

Clearing.—Mlingano Estate runs large for an experimental station. Nearly one-quarter of the area has now been fully opened up. Additions are made annually as more land can be utilized. This year an extra thirty acres of rubber were cleared in the vicinity of the labour camp and factory site at the northern end of the estate; another seven acres adjacent to the old dam were prepared and terraced for citrus nurseries; and the western experimental area was extended by five acres. Roughly seventy-five acres of secondary rubber growth and bush were cut down. New roads serving the factory and labour lines were surveyed and made.

To-day the principal developments are situated at opposite ends of the estate, the experimental areas and main buildings in the southern portion where ample suitable land is available, and the factory, labour camp and citrus nurseries at the northern extremity where water and power are obtainable. A level all-weather road connects the two areas.

An aerial photograph of the station was taken by the Department of Civil Aviation.

Buildings and Machinery.—The chief item in the building programme undertaken by the Public Works Department during the year was the erection of twenty-five houses of various types for a labour camp, as described in the report for last year. In addition a garage was built near the office, and a small workshop and tool-store close to the factory. Work on the foundations of the factory is well advanced but the completion of the building awaits the arrival of structural steelwork from overseas.

The single drum "Coronita" decorticator, fitted with special devices for rapid and accurate adjustments of the drum wheel, has arrived from Europe.

Messrs Gailey and Roberts, Limited, Nairobi, equipped the station, free of charge, with a twenty-horse-power kerosene Caterpillar tractor, complete with a subsoiler and disc-harrow, for experimental work on the mechanical cultivation of sisal.

An extra rain-water tank was made to augment the water supply to the residences and laboratory. Plans for a resthouse have been approved. A fumigatorium was built for treating blue sisal bulbils or other plants destined for distribution outside the Tanga Province.

Water Supply.—As foreshadowed last year, a new dam, now almost ready, has been constructed a short distance below the site of the existing one. The work was carried out by the station staff. The old dam filled to overflowing twice within the year. It has been stocked with fish which are breeding prolifically.

Pipes for the pipe-line to the factory, together with an automatic electrically driven water pump, have been delivered.

Experimental Areas.—Maintenance of experimental areas has comprised clean weeding and the removal of sucker growth. A modicum of weed growth is allowed during rainy periods to lessen the risk of soil wash ; on sloping ground contour ridges or hedges are used to prevent soil erosion.

One new trial designed to elucidate the intrinsic merits of bulbils and suckers after both have been raised in nurseries was planted ; various cultural systems in mature sisal will be tried as well. Progeny rows of bulbils of *Agave sisalana* seedlings received from Amani were planted.

A first cut was taken from seven experiments during the year. Harvesting methods were described in *Quartely Notes No. 10* ; details of yields are tabulated in part II of this report. A variety trial at Amani was also harvested. The cutting of sisal trials requires careful organization and absorbs a large amount of time. Decorticating facilities were kindly provided by Messrs Consolidated Sisal Estates of East Africa, Limited, and their assistance is gratefully acknowledged.

Blue Sisal Plantation.—Thirteen months have now elapsed since this plantation was cut for the first time ; a second cutting is due to be taken shortly and long heavy leaf is expected. Subsequent to the first cropping, when fifteen leaves were left on each plant, the production of new leaves was retarded somewhat and in individual cases the central bud became shorter. Also about three months later a small number of plants died from internal stem rot, the rot starting from an unhealed scar. The sisal weevil (*Scyphophorus acupunctatus*) may be implicated, although weevil were absent on a recently cut blue sisal plant suffering from stem rot.

A small area was cut the second time to provide test bales of sun-dried and artificially dried blue sisal fibre for examination at Lambeg. Thanks are expressed to Major von Brandis of the United Sigi Segoma Estates, Limited, for help given in this connection. The extracted fibre percentage was 3·46 and the waste (recovered by a waste reclamation plant) represented 18·2 per cent of the total fibre.

Because of the close spacing (2½m. by 1½m.) and the length of the leaves it was not possible to weed this plantation during the year, neither could any suckers be removed. Two thousand suckers from the experimental areas were sent to one estate.

Blue sisal bulbils from Amani were received for grading, fumigating and packing, 211,500 being despatched to sisal growing centres in Tanganyika and Kenya. Blue sisal bulbils are not so large as those of common sisal and do not withstand fumigation well.

Agave Collection.—The agave collection has provided the first poling plants on the station. Several *A. sisalana* plants, ex Yucatan, originally suckers and uncut, poled three and a half years after planting at Mlingano. No new species were added to the collection during the year.

Agave Seedlings and Hybrids.—These comprise: (i) *A. amaniensis* (selfed), (ii) *A. fortunae* (open-pollinated), (iii) *A. angustifolia* × *A. amaniensis*, (iv) *A amaniensis* × *A. angustifolia* and (v) *A. amaniensis* × *A. sisalana*. Originally raised by the Geneticist at Amani, the majority of these seedling agaves have been growing at Mlingano since June 1936; they are very diversified and few show much promise at the moment. Many of the *A. fortunae* plants have succumbed to weevil or sun-scorch.

The hybrids are the most promising and include several types which produce leaves rapidly, opening from ten to fifteen new leaves monthly; their fibre characteristics appear favourable. It is necessary to record total leaf production before any final selection work can be undertaken.

Citrus.—In collaboration with the Agricultural Officer, Tanga, a large citrus nursery was started. Seed beds of rough lemon were sown in July and twenty-five thousand stocks were transplanted during the small rains. They are growing satisfactorily and should be ready for budding next year. Later they will be available for sale to sisal estates and others for increasing fruit supplies for native labour. The citrus grove near the residences has made fair progress despite lack of irrigation; spraying against scale and leaf-eating insects is carried out at intervals.

Other Crops.—The imported mangoes are well-established. Further propagations of *Derris elliptica* were made; the *Mundulea suberosa* trees have increased in size and the bark is sampled periodically by the Biochemist, Amani. The cassava trial planted for the Plant Pathologist, Amani, was lifted this year.

Pests and Diseases.—The sisal weevil is troublesome in the agave collection where certain species are particularly susceptible to attack; the experiments have escaped serious harm.

Immediately after the heavy October rains a sudden outbreak of sun-scorch occurred in the sisal both on cut and uncut plants. Not every plant suffered; symptoms only appeared on upright leaves about two months old.

Publications.—The *Quarterly Notes* are issued regularly. One article and two reviews on sisal subjects were published in the *East African Agricultural*

Journal, and an article on sisal growing was contributed to the East African supplement of the *Manchester Guardian*.

Sisal Research at Amani and Lambeg.—Close relationship with the East African Agricultural Research Station, Amani, has continued and assistance from the staff is gratefully acknowledged. The station has also kept in contact with Dr Gibson and the research work on sisal utilization which he is conducting at Lambeg, Northern Ireland.

Touring.—Harvesting trials combined with development work on the station restricted touring though many estates in the Tanga and Northern provinces were visited.

Visitors.—Visitors to the station include E. Harrison, C.M.G., late Director of Agriculture; A. J. Wakefield, Director of Agriculture; the Director of Public Works; the Accountant-General; E. Bovill; Col C. E. Ponsonby, M.P.; H. Tanner; J.V. Gray; the Chief Inspector of Labour; the Provincial Commissioner, Tanga; the Director, Amani; Dr van der Veen, Java; E. Ayre; W. Downes; H. Schindler and R. Johns, Zanzibar.

PART II.—Review of Experiments

The year under review is notable in so far as it marks the commencement of cutting the sisal in seven experiments. Growth records collected hitherto may now be supplemented with data of fibre yields. A more positive though not absolute basis is thus afforded for comparing the effect of various cultural treatments upon sisal. Nothing final, however, is ascertainable from the experiments in their present stage. The yield from the first cutting is but a fraction of the total crop which will be obtained during the life cycle of the sisal and entire yields must be known before reliable conclusions can be formed.

Consequently the results given in this section are published with extreme reserve, especially in view of the fact that in four trials it is not possible to attach any significance to the figures either because only certain plots have been cut or else the cutting simply denotes the application of the treatments for the first time and after effects remain undetermined.

The striking progress of much of the sisal since planting in 1936 made it apparent that unless cutting was started this year good leaf would be lost through natural withering. Therefore cutting began when the sisal was between twenty-two and thirty months old. In the absence of experimental evidence upon the best system of cutting, which should be forthcoming eventually, it was decided to start cutting when the plants had a complement of eighty to ninety sound leaves and the average length of the last unfurled leaf was 120 centimetres. Excluding one trial purposely cut heavily, cutting erred on the side of leniency. The fairly even development of the sisal enabled each experiment to be cut uniformly.

The additional information supplied by the initial cutting of several thousands of plants helps materially towards relating growth measurements with fibre yields. It can now be demonstrated that the largest plants at the time of the first cutting generally give the best yields of leaf since they almost invariably possess the highest number of mature leaves besides having the longest leaves. Because of the practical limitations in determining fibre yields separately for large numbers of plants, the study of individual yields could not be carried beyond counting and weighing the leaf. Nevertheless it was established that the number and the weight of leaves obtained from plots of twenty-five plants are respectively correlated with the fibre yield per plot. From this it may be inferred that plants yielding most leaf would in all likelihood yield most fibre, especially as the physical characteristics of single leaves are related to their actual fibre content.

On the whole fibre yields were quite good considering the earliness of the cut and the wide spacing employed (3m. by 1m. or 9·75ft by 3·25ft, giving 3,333 plants per hectare or 1,349 per acre). Plot yields are calculated in terms of tons per unit area of land in order to make them more intelligible, but the arithmetical process of conversion assumes a complete stand of plants which tends to exaggerate the yield figures a little. Also it is improbable that soil of the high order of uniformity as occurs in the experimental plots can be found over wider areas. Even so the margin left after granting due allowance for these factors influencing yields, is sufficient to indicate what might be attained on a larger scale under similar circumstances.

Although climate, soil, spacing and cultivation have undoubtedly contributed in a large measure towards the precocity of the sisal at Mlingano, much can be traced back to the period of planting. The soil was adequately prepared beforehand and planting took place at a favourable time of the year, but above all, only selected planting material was used. The value of good plants combined with the suppression of weed growth during the early years of the plantation for securing early returns in addition to satisfactory yields cannot be over emphasized. It still remains to be seen how long this advanced sisal will live and how it will yield before the onset of poling. Should the total number of leaves a sisal plant is capable of producing be limited, then rapid growth implies early poling, though it ought to result in the maximum number of those leaves being harvested.

TABLE I

CULTIVATION TRIAL

Layout: 6×6 Latin Square.

Planted: April 1936.

Analysis of Growth Records

LEAF NUMBER

TREATMENTS	Mean number of new leaves produced per plant between 29/6/36 and December 1938	Mean increase in number of new leaves per plant during twelve months ending	
		6/12/37	6/12/38
Surface clean weeding	138·8	63·5	54·5
Clean weeding and deep cultivation ...	131·4	59·9	52·9
Cover crop (*Calapogonium mucunoides*)...	112·3	47·0	48·1
Weeding twice annually	105·1	44·8	44·1
Cutlassing weeds	79·2	28·5	36·8
Uncontrolled weeds	62·1	19·1	30·8
*Difference required for significance (P=·05)	6·9	3·22	3·62

*The figure calculated for "Significant difference" is that which must be exceeded by the difference between any two treatment averages before the latter difference can be regarded as significant or attributable to treatment effect and not to chance. Significance at 5 per cent (as shown in every table) is normally accepted to separate effects due to treatment from effects due to chance, that is the odds are 95 to 5 or 19 to 1 that the observed effect is due to treatment. Odds of less than 19 to 1 are usually termed "non-significant" and odds of more than 19 to 1 "significant."

In order of leaf production the treatments have remained unchanged for the past two years.

The clean weeded plots continue to be superior to the others; judging by the yearly figures, however, their leaf output during 1938 was rather less than in the previous year. This is explained by the monthly growth rate only exceeding five new leaves for two months, March and April in 1938, against eight months in 1937, and also because they received a slight setback from the first cutting taken in August.

The plots cover-cropped or weeded periodically have grown at very nearly the same rate as last year while a decided improvement, attributable to the sisal now being taller, can be noted in the weedy plots, although this sisal is still very backward.

The net result to date is that the disparity between the monthly growth rates of the sisal under the various treatments in this trial is not so large as formerly and that the clean weeded sisal was ready for cutting first.

TABLE II

Analysis of Growth Records

LEAF LENGTH

TREATMENTS	Mean length of last unfurled leaf in centimetres on 6/12/38	Mean increase in centimetres during the year	
		1937	1938
Surface clean weeding	120·8	49·3	19·2
Clean weeding and deep cultivation ...	119·5	48·6	20·6
Cover crop	110·4	35·1	26·9
Weeding periodically	111·8	35·9	27·3
Cutlassing weeds	97·4	27·5	21·8
Uncontrolled weeds	84·2	26·1	10·4
Difference required for significance (P=·05)	6·8	4·28	4·16

A slowing up in the rate of increase of leaf length in all treatments is now evident. It would be beyond natural expectations for the length of the leaves to continue to increase at the same rate as last year. In all plots the leaf length remained stationary during the period June to September, thereafter declining a little, partially due to a dry spell of weather. Cutting adversely affected the leaf length of the clean weeded sisal by ten centimetres. Soon after cutting a few leaves unfurled quickly before they were fully developed, and leaves which opened during the following three or four months were shorter, which gave the plant a flat-topped instead of a conical shape.

TABLE III

YIELD DATA

First Cut, 24th August 1938

25 leaves left uncut per plant

	TREATMENTS	
	Surface Clean weeding	Clean weeding and deep cultivation
Leaf:		
Average number of leaves cut per plant ...	64·5	62·7
Average weight of leaf cut per plant (kgs) ...	36·5	33·5
Yield of leaf per hectare (tons)	122	112
Yield of leaf per acre (tons)	49	45
Average number of leaves per ton of fibre ...	73,225	79,234
Fibre (extracted unbrushed):		
Yield of fibre per hectare (tons)	2·93	2·64
Yield of fibre per acre (tons)	1·19	1·07
Average yield of fibre per plant (kgs)	0·880	0·792
Average yield of fibre per leaf (gms)	13·6	12·6
Percentage extracted fibre to leaf weight ...	2·41	2·36

Leaf length varied between 60 and 120 centimetres. Since only one-third of the plots in this experiment have been cut an analysis of variance eliminating positional effects cannot be made yet. Comparing the plot yields for these

two clean weeding treatments as they stand shows that the difference in the number of leaves cut, weight of leaf, and yield of fibre per plot are not significant.

Further analysis of the data of the plots indicated a significant positive correlation between the weight of leaf per plot and the weight of extracted fibre per plot ($r = + \cdot 990$, sig. at $P = \cdot 01$).

Examination of individual plant records showed a strong positive correlation between the number of leaves cut per plant and the weight of leaf cut per plant at the first cutting ($r = + \cdot 965$, sig. at $P = \cdot 01$). Briefly, plants with the best vegetative development have tended to yield most weight of leaf.

Another correlation was established between the total number of leaves produced during the first nine months in the field, when the sisal was quite young, and the weight of leaf removed at the first cut ($r = + \cdot 457$, sig. at $P = \cdot 01$). All these earliest leaves had withered by the time cutting took place and so have not entered into the yields. This correlation points to the connection between leaf production during the early months and fibre yields at the first cut, and stresses the value of fostering the growth of young sisal. Furthermore, of the total number of leaves produced since planting in the field, only thirty-six per plant were lost through natural causes in the case of surface clean weeding and thirty-one per plant in the case of clean weeding combined with deep cultivation, the remainder representing good leaf over 60 centimetres long. Thus of the total number of leaves produced to date by this sisal (see table I), approximately 75 per cent is economic leaf.

Using records covering a period of twenty-nine months another attempt was made to correlate sisal growth with rainfall. The correlation was only significant ($P = \cdot 05$) for the weedy sisal.

TABLE IV

Spacing Trial

Layout: Six randomized blocks of eight plots each.
Plot size is 120 square metres.
Planted: May 1936.

Analysis of Growth Records

Treatments (Spacing in metres)	Density (No. of plant per hectare)	Mean number of new leaves produced per plant from 27/7/36 to 29/11/38	Mean length of last opened leaf on 29/11/38 in centimetres
A. 2·00 × 0·50	10,000	96·3	117·8
B. 3·00 × 0·50	6,666	107·5	126·8
C. 2·40 × 0·65	6,410	112·0	120·0
D. 2·00 × 1·00	5,000	122·3	116·4
E. 2·40 × 1·00	4,166	126·2	117·7
F. 3·00 × 1·00	3,333	132·5	122·2
G. 2·00 × 2·00	2,500	140·2	117·5
H. 3·00 × 2·00	1,666	145·4	121·1
Difference required for significance (P=·05)		2·7	3·4

Differences in the leaf production of the sisal at all spacings are now significant. At present the densely planted sisal (A, B and C) grows between two to three new leaves monthly, the more generously spaced (D, E and F) from three and a half to four new leaves, while at the wider spacings (G and H) the sisal

produces from four and a half to five and a half new leaves monthly. The figures rather flatter the widely spaced sisal which is not so impressive when viewed in the field; the edges of its leaves also yellowed during the mid-year dry weather. It is interesting to note that the closely planted sisal compares well with sisal at wider spacings as regards leaf length.

The monthly increment of leaf in the closely planted sisal varied from 18,000 to 21,000 new leaves per hectare, whereas for treatment D (2m. by 1m.) it is about 17,000. The former leaf appears to be rather thinner than the latter, but until actual leaf and fibre yields have been determined, further comments cannot be made. Cutting will begin shortly.

Common Sisal (*A. sisalana*) Cutting Trial

Layout: 7 × 7 Latin square, 25 recorded plants per plot.

Planted: April 1936.

This trial is designed to compare different systems of cutting sisal. Cutting began last October or thirty months from planting. Prior to cutting the sisal had made very uniform growth, identical treatment having been given to all plots.

The main differentiation therefore will arise as a result of cutting. For the commencement certain plots were cut heavily and others lightly, while a few were left uncut because they will not be harvested until poling commences Fourteen uppermost leaves per plant were left on the heavily cut sisal, and twenty-eight leaves per plant on the lightly cut sisal; the latter resulted in a cutting angle of forty-five degrees from the horizontal.

Yields are summarized in table V although at this stage the figures supply no guidance upon cutting. It is interesting to note that the removal of an extra fourteen leaves increased fibre yields by nearly one ton per hectare.

TABLE V

First Cutting—17th October 1938

	Light Cutting 28 leaves left	Heavy Cutting 14 leaves left
Leaf:		
Average number of leaves cut per plant	59·0	72·7
Average weight of leaf cut per plant (kgs)	36·0	47·1
Yield of leaf per hectare (tons)	120	157
Yield of leaf per acre (tons)	48	63
Number of leaves per ton of fibre	70,192	64,450
Fibre (extracted unbrushed):		
Yield of fibre per hectare (tons)	2·80	3·76
Yield of fibre per acre (tons)	1·13	1·52
Average yield of fibre per plant (kgs)	0·841	1·127
Average yield of fibre per leaf (gms)	14·2	15·5
Percentage extracted fibre to leaf weight	2·34	2·39

It is too early to discern the after-effects of cutting. At the moment no significant differences have arisen in the growth measurements taken since cutting though they may become apparent in the new year.

Cutting Trial

A. sisalana vs. *A. amaniensis*

The intention of this trial is to determine how fibre yields are affected by various cutting systems commencing from the second, third and fourth year from planting. The trial was planted in June 1936 therefore certain plots were due for cutting this year.

Twenty-five leaves were left uncut per plant. Yield data are tabulated below and differences are not significant.

TABLE VI

FIRST CUT—TWO YEARS FROM PLANTING IN THE FIELD

	A. sisalana	*A. amaniensis*
Leaf:		
Average number of leaves cut per plant ...	45·7	42·9
Average weight of leaf cut per plant	17·9	21·2
Yield of leaf per hectare (tons)	60	71
Yield of leaf per acre (tons)	24	29
Number of leaves per ton of fibre	109,966	76,386
Fibre (extracted unbrushed):		
Yield of fibre per hectare (tons)	1·38	1·87
Yield of fibre per acre (tons)	0·56	0·76
Average yield of fibre per plant (kgs)	0·415	0·562
Average yield of fibre per leaf (gms)	9·09	13·09
Percentage extracted fibre to leaf weight ...	2·32	2·65

TABLE VII

BULBILS *vs.* SUCKERS TRIAL

Layout: 6×6 Latin square with two sub-plots of fifteen plants each per plot.

Planted: June 1936.

Analysis of Growth Records

Main Treatments	Mean number of new leaves per plant produced between 30/7/36 and 24/12/38	Mean length of last opened leaf on 24/12/38 in centimetres
Bulbils, planted shallowly	136·0	123·2
,, planted deeply	132·0	123·0
,, small, planted shallowly	130·1	117·0
Suckers, planted shallowly	124·4	125·1
,, planted deeply	118·8	125·0
,, small, planted shallowly	120·8	122·5
Difference required for significance (P=·05)	2·87	2·52
Treatments grouped.		
Bulbils	132·7	121·1
Suckers	121·3	124·2
Difference required for significance (P=·05)	1·52	1·33
Material planted shallowly	130·2	124·2
,, ,, deeply	125·4	124·0
Difference required for significance (P=·05)	1·89	1·66
Plants untrimmed	129·4	124·6
,, trimmed	124·7	120·7
Difference required for significance (P=·05)	1·70	1·44

The foregoing table shows the progress of the sisal in this trial up to the present. Although bulbils still compare rather favourably with suckers, and shallowly planted or untrimmed material is slightly more advanced than other treatments, the magnitude of the differences has hardly changed since last year. Analyses of monthly growth records indicate that sisal of whatever origin or however planted produced new leaves at an equal rate during the past year.

Differentiation exists as regards general development only; this may be reflected later in leaf or fibre yields.

TABLE VIII

Variety Trial

Layout: Six randomized blocks of six plots each, 25 recorded plants per plot.

Planted: May 1936.

Analysis of Growth Records

Treatments	Mean Number of new leaves produced per plant:—		Monthly average for 1938	Mean length of last opened leaf on 8/12/38 in centimetres
	Between 6/7/38 and 8/12/38	During 1938		
A. sisalana bulbils	136·7	52·9	4·41	119·5
A. sisalana suckers	129·7	56·0	4·67	126·8
A. amaniensis bulbils	116·5	47·2	3·94	135·7
A. amaniensis suckers	116·5	47·6	3·97	134·1
A. cantala suckers	153·7	71·9	5·99	129·8
A. fourcroydes bulbils	90·3	36·6	3·05	125·6
Difference required for significance (P=·05)	6·9	2·93	0·31	5·9

In manner of growth the distinguishing features of the four varieties of fibre agaves are:—*A. cantala* produces leaves fairly rapidly, *A. fourcroydes* is the slowest, whereas *A. amaniensis* produces rather fewer leaves than *A. sisalana* but its leaf is longer.

During the first eighteen months of this trial the *A. sisalana* bulbils gained about ten leaves on the average over the *A. sisalana* suckers (originating from estate sisal). Latterly the suckers have tended to catch up the bulbils as regards leaf production, mostly due to the latter being slightly retarded by a cutting in March. In recent months, however, the respective monthly growth rates have not differed. Both bulbils and suckers of blue sisal (*A. amaniensis*) have grown uniformly and they were also cut last March.

The results of this cutting are tabulated below:—

TABLE IX

First Cut

22 months after planting.

35 leaves left uncut per plant.

	A. sisalana bulbils	*A. amaniensis*	
		bulbils	suckers
Leaf:			
Average number of leaves cut per plant	41·6	31·1	34·2
Average weight of leaf cut per plant (kgs)	16·0	13·7	11·8
Yield of leaf per hectare (tons) ...	53	46	39
Yield of leaf per acre (tons)	21	19	16
Number of leaves per ton of fibre ...	110,959	103,162	115,123
Fibre (extracted, unbrushed):			
Yield of fibre per hectare (tons) ...	1·25	1·17	0·99
Yield of fibre per acre (tons)	0·51	0·47	0·40
Average yield of fibre per plant (kgs)	0·375	0·350	0·298
Average yield of fibre per leaf (gms)	9·01	9·69	8·69
Percentage extracted fibre to leaf weight	2·34	2·55	2·52

As yet it is not possible to analyse these figures statistically. The differences are not significant. It is clear from the yields that the cut was a very light one. A light initial cutting serves a purpose in removing short and spotted leaf rendering grading for length almost unnecessary in subsequent cuttings.

TABLE X

Blue Sisal Spacing Trial

Layout: 4×4 Latin Square.

Planted: July 1936.

Plot size is 120 square metres.

Analysis of Growth Records

Density	Mean number of new leaves produced per plant between 30/9/36 and 30/12/38	Mean length of last opened leaf on 30 12/38 in centimetres
5,000 plants per hectare	92·5	129·7
4,166 ,, ,, ,, ...	101·1	136·5
2,914 ,, ,, ,, ...	107·4	134·4
1,666 ,, ,, ,, ...	106·9	133·3
Difference required for significance (P=·05)	4·8	2·5

Blue sisal spaced 2m. by 1m. (five thousand plants per hectare) has grown slower and produced rather shorter leaf than that planted at wider spacings. The trial is ready for a first cutting.

Sucker Control Trial

Layout: Six randomized blocks of four plots each.

Planted: June 1936.

Sucker growth has been permitted in one of the four proposed treatments forming this trial, the competition of the sucker plants has brought about a significant though small diminution in the growth rate compared with the sisal kept free of suckers.

Interplanting Trial

Layout: Eight randomized blocks of four plots each.

Planted: April 1936.

Cotton, beans and maize were interplanted in the sisal during the first two years, 1936 and 1937. Subsequently the sisal was kept clean weeded. A first cutting was taken in November 1938, leaving twenty-eight leaves per plant. Yield records are given in table XI.

Maize and cotton have both depressed the sisal yields obtained at the first cutting, the former reducing fibre yields to the order of about half a ton to the hectare compared with sisal which was not interplanted. Neither of these crops was particularly good, especially the cotton, therefore, in view of the wide spacing of the sisal (3m. by 1m.), such a marked effect upon the productivity of the sisal was not anticipated. With better intercrops and closer spacing of the sisal a more pronounced setback to the sisal might be expected on similar or poorer soils. The cultivation of beans, a non-shading crop, in sisal has not caused a significant difference in fibre yields. (See Table XI.)

Dressings of fertilizers were applied in 1936 and 1937 at the following rates per hectare each time:—

Nitrogen	... ...	5cwts. sulphate of ammonia.
Phosphate	... ...	6 ,, double superphosphate.
Potash	... ...	5 ,, sulphate of potash.
Lime	... ...	$2\frac{1}{2}$ tons burnt agricultural lime.

In both trials the nitrogen and phosphate, and the nitrogen, phosphate and potash plots show a significant response over the unmanured plots. (See Tables XII and XIII.)

General Remarks

After a period of about two and a half years certain trials reached the bearing stage thereby affording more vital and interesting information upon the reaction of sisal to various cultural methods. At this juncture it is manifestly not possible to deduce very much from the growth and yield figures except perhaps to note the way good plants and planting methods may contribute towards hastening the maturity of sisal coupled with securing satisfactory yields from the first cutting.

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March 1939.

TABLE XI

FIRST CUTTING—NOVEMBER 1938

	Treatments				General mean	Standard error	Difference required for significance (P = ·05)
	No inter-cropping clean weeding	Cotton	Beans	Maize			
Average number of leaves cut per plant ...	62·0	58·7	60·1	55·5	59·1	0·79	2·41
Per cent	105·0	99·0	102·0	94·0	100·0	1·34	4·08
Average weight of leaf cut per plot (kgs) ...	1,010	921	971	835	934	20·1	60·9
Per cent	108	98	104	89	100	2·15	6·51
Yield of fibre (extracted, unbrushed) in tons:							
Per hectare	3·41	3·05	3·27	2·79	3·13	0·07	0·20
Per acre	1·38	1·23	1·32	1·13	1·27	0·03	0·08
Per cent	109·00	97·00	104·00	89·00	100·00	2·10	6·30
Percentage extracted fibre to leaf weight ...	2·53	2·48	2·53	2·50	2·51	—	—

TABLE XII

Nitrogen Manurial Trial, First Cutting—July 1938

20 leaves left uncut per plant

	Treatments						General mean	Standard error	Difference required for significance (P=·05)
	No manure	N	NP	NK	NPK	NL			
Average weight of leaf cut per plot (kgs) ...	920	988	1,026	1,001	1,043	950	988	22·1	69·7
Per cent	93	100	104	101	105	96	100	2·2	7·0
Yield of fibre (extracted, unbrushed) in tons:									
Per hectare	2·96	3·17	3·49	3·13	3·36	3·08	3·20	0·10	0·32
Per acre	1·20	1·28	1·41	1·27	1·36	1·25	1·29	0·04	0·13
Per cent	92	99	109	98	105	96	100	3·2	10·1
Percentage extracted fibre to leaf weight	2·41	2·41	2·55	2·35	2·42	2·43	2·43	—	—

Differences in the number of leaves cut per plot were not significant.

The mean number of leaves cut per plant for all treatments was 69·3.

TABLE XIII

Phosphate Manurial Trial, First Cutting—August 1938

29 leaves left uncut per plant

	Treatments						General mean	Standard error	Difference required for significance (P=·05)
	No manure	P	NP	PK	NPK	PL			
Average number of leaves cut per plant ...	70·0	69·1	72·5	68·8	71·8	68·8	70·2	0·65	2·06
Per cent	100	98	103	98	102	98	100	0·9	2·93
Average weight of leaf cut per plot (kgs)	978	1,045	1,133	1,034	1,104	1,041	1,056	22·1	69·9
Per cent	93	99	107	98	104	98	100	2·1	6·6
Yield of fibre (extracted, unbrushed) in tons:									
Per hectare	3·01	3·20	3·50	3·16	3·40	3·17	3·24	0·08	0·24
Per acre	1·22	1·29	1·42	1·28	1·38	1·28	1·31	0·03	0·10
Per cent	93	99	108	98	105	98	100	2·4	7·4
Percentage extracted fibre to leaf weight	2·31	2·30	2·32	2·29	2·31	2·28	2·30	—	—

APPENDIX

Rainfall Records

Month	1936		1937		1938	
	Amount of rain (mm.)	No. of days rain	Amount of rain (mm.)	No. of days rain	Amount of rain (mm.)	No. of days rain
January	46·2	7	13·1	1	1·2	4
February	121·8	11	9·6	3	29·2	4
March	13·1	3	258·5	10	167·7	12
April	189·7	19	153·3	27	235·9	12
May	268·1	22	193·1	22	271·9	19
June	190·2	16	16·8	8	25·6	5
July	31·6	12	10·5	9	38·9	8
August	153·9	10	48·5	10	23·1	7
September	94·8	16	39·0	11	56·6	15
October	152·3	10	481·4	19	347·8	11
November	27·9	8	96·5	15	65·6	11
December	45·8	13	86·1	10	55·4	12
Total ...	1,335·4	147	1,406·4	145	1,318·9	120